

REMARKS

Claims 1-16 currently remain in the application. Claim 1 is herein amended.

Claim 1 was rejected under 35 U.S.C. 102 as being anticipated by Norimichi and dependent claims 2-16 were rejected under 35 U.S.C. 103 over Norimichi in view of one or more other secondary references cited by the Examiner.

At least in part in view of these cited references and the Examiner's reasons for these rejections, applicant has herein amended independent claim 1 by introducing an additional limitation that the expanded-graphite sheet of the subject matter comprises expanded-graphite obtained by heat-treating and thereby expanding graphite which has been soaked in a liquid. This additional limitation is supported by the specification (say, in page 6 at lines 15-17) and hence should be deemed enterable.

Moreover, this additional characterization is believed to overcome the Examiner's rejection because the graphite sheet taught by Norimichi is a product obtained from a "thermal expansion vapor growth graphite fiber" (See claim 1). A thermal expansion vapor growth graphite fiber has a special structure completely different from that of expanded-graphite.

Norimichi relates to a flexible graphite sheet material comprising at least a thermal expansion vapor growth graphite fiber and having a surfacewise thermal conductivity of $120\text{Kcal}/(\text{m}\cdot\text{hr}\cdot^{\circ}\text{C})$ or more, and its Example 1 describes a flexible graphite sheet material made only of a thermal expansion vapor growth graphite fiber material and having a surfacewise thermal conductivity of $600\text{Kcal}/(\text{m}\cdot\text{hr}\cdot^{\circ}\text{C})$, or $697\text{W}/(\text{m}\cdot\text{K})$.

Although Norimichi's Example 2 relates to another flexible graphite sheet material which is a 9:1 mixture of thermal expansion graphite made from natural graphite and a thermal expansion vapor growth graphite fiber material but its surfacewise thermal conductivity is only $140\text{Kcal}/(\text{m}\cdot\text{hr}\cdot^{\circ}\text{C})$, or $163\text{W}/(\text{m}\cdot\text{K})$, and Norimichi does not disclose any flexible graphite sheet material made from a thermal expansion graphite and having surfacewise thermal conductivity of $350\text{W}/(\text{m}\cdot\text{K})$ or more.

The present invention relates to a sheet made from expanded graphite which has been obtained by heat-treating graphite and has become cotton wool-like (page 4, lines23-24), having been adjusted such that its surfacewise thermal conductivity will be over $350\text{W}/(\text{m}\cdot\text{K})$. Cotton wool-like expanded graphite is an assembly of expanded graphite materials with radial lengths shorter than axial lengths and having axial lengths of several millimeters such that many air layers are present among them. It is only because such cotton wool-like materials are used that the surfacewise thermal conductivity can be adjusted to be over $350\text{W}/(\text{m}\cdot\text{K})$.

Norimichi, by contrast, does not disclose any flexible graphite sheet material including as its material flexible thermal expansion graphite with surfacewise thermal conductivity of $350\text{W}/(\text{m}\cdot\text{K})$ or more, although its Example 1 discloses a flexible graphite sheet material made only of thermal expansion vapor growth graphite fibers with surfacewise thermal conductivity of $600\text{Kcal}/(\text{m}\cdot\text{hr}\cdot^{\circ}\text{C})$, or $697\text{W}/(\text{m}\cdot\text{K})$.

It should be noted that vapor growth graphite fibers and expanded graphite are obtained by different methods and their crystalline structures are different. Because of this difference, thermal expansion of vapor growth graphite fibers is difficult because vapor growth graphite fibers have layers in the form of annual rings and end surfaces of each layer appear only at the ends in the axial direction. Thus, acid such as sulfuric acid cannot penetrate easily between these layers.

Since vapor growth graphite fibers are a special material having a different crystalline structure unlike expanded graphite, they can be produced only to lengths of several tens of micrometers. It would be clear to a person skilled in the relevant art that they cannot produce sheets of the type obtainable from expanded graphite fibers of this invention with lengths of several millimeters. Thus, it is believed that the present invention related to an expanded-graphite sheet comprising expanded-graphite obtained by heat-treating and thereby expanding graphite which has been soaked in a liquid and having a thermal conductivity of $350\text{W}/(\text{m}\cdot\text{K})$ or more in a direction parallel to the surface is novel and patentable.

The secondary references cited by the Examiners are directed only to the dependent claims and do not disclose the new characterization of claim 1 now being effected. Thus, it is believed that the claims 2-16 now dependent from amended claim 1 are also allowable.

In summary, it is believed that the present Amendment is totally responsive to the Office Action and hence that the application is now in condition for allowance. Such action at an early date is earnestly solicited.

Respectfully submitted,
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